

WHAT IS CLAIMED:

1 1. In a sending station operable in a communication system to send data upon a
2 communication channel susceptible to fading, an improvement of apparatus for placing the data
3 in a form to facilitate communication thereof upon the communication channel, said apparatus
4 comprising:

5 an encoder coupled to receive first values representative of the data to be
6 communicated upon the communication channel, said encoder for encoding the first value
7 representative of the data into encoded form, the encoded form forming a codeword of a
8 recursive, systematic space-time code, and the codeword complying with an equal eigenvalue
9 criterion .

10 2. The apparatus of claim 1 wherein said encoder comprises a first systematic
11 recursive structure including a feedback path formed therein.

12 3. The apparatus of claim 1 wherein the codeword of the systematic space-time code,
13 into which said encoder encodes the first values representative of the data, includes at least a
14 systematic part, and wherein the systematic part is formed of untransformed values of the first
15 values representative of the data.

16 4. The apparatus of claim 3 wherein the codeword of the systematic space-time code,
17 into which said encoder encodes the first values representative of the data, is further formed of

1 parity values, the parity values derived from the first values representative of the data.

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3 5. The apparatus of claim 1 wherein the codeword of the systematic space-time code,
into which said encoder encodes the first values representative of the data, includes parity values,
the parity values being derived from the first values representative of the data.

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3 6. The apparatus of claim 1 wherein the codeword of the systematic space-time code,
into which said encoder encodes the first values representative of the data, comprises at least one
systematic symbol value and at least one parity value.

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5 7. The apparatus of claim 1 wherein the communication system comprises a radio
communication system, wherein the sending station comprises a fixed-site transceiver, and
wherein the codeword of the recursive, systematic space-time code constructed by said encoder is
communicated by the fixed site transceiver upon a radio channel which forms the communication
channel.

1 8. The apparatus of claim 1 wherein said encoder comprises a coset selecting coder

1 coupled to receive at least one of the first values, said coset selecting coder for producing coset
2 addressing values.

1 9. The apparatus of claim 8 wherein at least one part of the coset addressing values
2 produced by said coset selecting coder comprises a parity value.

1 10. The apparatus of claim 8 wherein at least one part of the coset addressing values
2 produced by said coset selecting coder comprises a non-derived value.

1 11. The apparatus of claim 8 wherein said encoder further comprises a signal entity
2 selector coupled to said coset selecting coder, said signal entity selector for selecting a
3 multidimensional constellation entity related to the coset addressing values produced by said
4 coset selecting coder, a multi-dimensional constellation entity forming at least part of the
5 codeword of the systematic recursive space-time code.

1 12. The apparatus of claim 11 wherein said signal entity selector generates a binary
2 representation of the multi-dimensional constellation entity.

1 13. The apparatus of claim 11 wherein said signal entity selector is further coupled to
2 receive at least one of the first values and wherein the multi-dimensional constellation entity
3 selected at said signal entity selector is further related to the at least one of the first values.

1 14. The apparatus of claim 13 wherein the at least one of the first values to which said
2 first signal entity selector is coupled to receive comprises a systematic part.

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4 15. In a method of communicating in a communication system having a sending
5 station operable to send data upon a communication channel susceptible to fading, an
6 improvement of a method for placing the data in a form to facilitate communication thereof upon
7 the communication channel, said method comprising:

8 applying values representative of the data to be communicated upon the
9 communication channel to an encoder;

10 encoding the values into encoded form, the encoded form forming a codeword of
11 a recursive, systematic space-time code, and the codeword complying with an equal eigenvalue
12 criterion.

1 16. The method of claim 15 wherein the codeword of the recursive, systematic space-
2 time code formed during said operation of encoding comprises both untransformed values
3 representative of the data to be communicated upon the communication channel and parity
4 values, the parity values derived from the values representative of the data.

1 17. The method of claim 15 wherein said operation of encoding comprises the
2 operations of:

3 selecting coset addressing values; and thereafter

4 selecting a multi-dimensional constellation entity related to the coset addressing

5 values , the multi-dimensional constellation entity forming at least part of the codeword of the

6 systematic recursive space-time code.

1 18. The method of claim 17 comprising the additional operation of representing the

2 multi-dimensional constellation entity in binary form.

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